

COMP 605 – H.W.5

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In this HW, we solve the Laplace equation in two dimensions with finite differences. A mesh size of 12×12 is used and is decomposed using 4 processors in MPI.

The stopping criteria is L2 -norm of the error must be less than 0.01 and the maximum number of iterations cannot exceed 100.

Below is the output of program that shows the L2-norm of the error at each iteration and the execution time.

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At iteration 1, diff is 5.477226e+00
At iteration 2, diff is 2.738613e+00
At iteration 3, diff is 1.960299e+00
At iteration 4, diff is 1.572720e+00
At iteration 5, diff is 1.330872e+00
At iteration 6, diff is 1.159807e+00
At iteration 7, diff is 1.030224e+00
At iteration 8, diff is 9.280958e-01
At iteration 9, diff is 8.454563e-01
At iteration 10, diff is 7.771879e-01
At iteration 11, diff is 7.197564e-01
At iteration 12, diff is 6.706267e-01
At iteration 13, diff is 6.279462e-01
At iteration 14, diff is 5.903472e-01
At iteration 15, diff is 5.568121e-01
At iteration 16, diff is 5.265782e-01
At iteration 17, diff is 4.990683e-01
At iteration 18, diff is 4.738414e-01
At iteration 19, diff is 4.505562e-01
At iteration 20, diff is 4.289450e-01
At iteration 21, diff is 4.087953e-01
At iteration 22, diff is 3.899355e-01
At iteration 23, diff is 3.722255e-01
At iteration 24, diff is 3.555490e-01
At iteration 25, diff is 3.398087e-01
At iteration 26, diff is 3.249219e-01
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At iteration 27, diff is 3.108177e-01
At iteration 28, diff is 2.974344e-01
At iteration 29, diff is 2.847186e-01
At iteration 30, diff is 2.726228e-01
At iteration 31, diff is 2.611051e-01
At iteration 32, diff is 2.501282e-01
At iteration 33, diff is 2.396583e-01
At iteration 34, diff is 2.296652e-01
At iteration 35, diff is 2.201212e-01
At iteration 36, diff is 2.110012e-01
At iteration 37, diff is 2.022822e-01
At iteration 38, diff is 1.939431e-01
At iteration 39, diff is 1.859643e-01
At iteration 40, diff is 1.783278e-01
At iteration 41, diff is 1.710166e-01
At iteration 42, diff is 1.640152e-01
At iteration 43, diff is 1.573088e-01
At iteration 44, diff is 1.508839e-01
At iteration 45, diff is 1.447273e-01
At iteration 46, diff is 1.388271e-01
At iteration 47, diff is 1.331717e-01
At iteration 48, diff is 1.277504e-01
At iteration 49, diff is 1.225528e-01
At iteration 50, diff is 1.175693e-01
At iteration 51, diff is 1.127907e-01
At iteration 52, diff is 1.082081e-01
At iteration 53, diff is 1.038133e-01
At iteration 54, diff is 9.959832e-02
At iteration 55, diff is 9.555560e-02
At iteration 56, diff is 9.167792e-02
At iteration 57, diff is 8.795840e-02
At iteration 58, diff is 8.439047e-02
At iteration 59, diff is 8.096784e-02
At iteration 60, diff is 7.768450e-02
At iteration 61, diff is 7.453471e-02
At iteration 62, diff is 7.151299e-02
At iteration 63, diff is 6.861405e-02
At iteration 64, diff is 6.583288e-02
At iteration 65, diff is 6.316465e-02
At iteration 66, diff is 6.060474e-02
At iteration 67, diff is 5.814872e-02
At iteration 68, diff is 5.579237e-02
At iteration 69, diff is 5.353160e-02
At iteration 70, diff is 5.136253e-02

At iteration 71, diff is 4.928143e-02
At iteration 72, diff is 4.728471e-02
At iteration 73, diff is 4.536895e-02
At iteration 74, diff is 4.353085e-02
At iteration 75, diff is 4.176726e-02
At iteration 76, diff is 4.007515e-02
At iteration 77, diff is 3.845162e-02
At iteration 78, diff is 3.689389e-02
At iteration 79, diff is 3.539928e-02
At iteration 80, diff is 3.396524e-02
At iteration 81, diff is 3.258931e-02
At iteration 82, diff is 3.126912e-02
At iteration 83, diff is 3.000243e-02
At iteration 84, diff is 2.878706e-02
At iteration 85, diff is 2.762093e-02
At iteration 86, diff is 2.650204e-02
At iteration 87, diff is 2.542848e-02
At iteration 88, diff is 2.439842e-02
At iteration 89, diff is 2.341009e-02
At iteration 90, diff is 2.246179e-02
At iteration 91, diff is 2.155191e-02
At iteration 92, diff is 2.067889e-02
At iteration 93, diff is 1.984124e-02
At iteration 94, diff is 1.903752e-02
At iteration 95, diff is 1.826635e-02
At iteration 96, diff is 1.752643e-02
At iteration 97, diff is 1.681648e-02
At iteration 98, diff is 1.613529e-02
At iteration 99, diff is 1.548169e-02
At iteration 100, diff is 1.485457e-02
At iteration 101, diff is 1.425285e-02
At iteration 102, diff is 1.367551e-02
At iteration 103, diff is 1.312155e-02
At iteration 104, diff is 1.259003e-02
At iteration 105, diff is 1.208005e-02
At iteration 106, diff is 1.159072e-02
At iteration 107, diff is 1.112121e-02
At iteration 108, diff is 1.067072e-02
At iteration 109, diff is 1.023848e-02
At iteration 110, diff is 9.823751e-03
The elapsed time is: 0.000880